

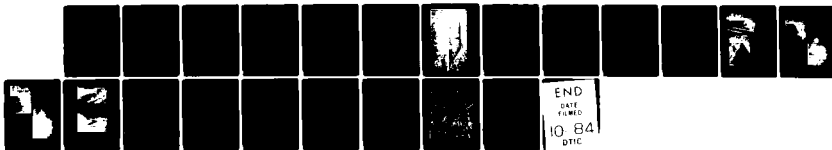
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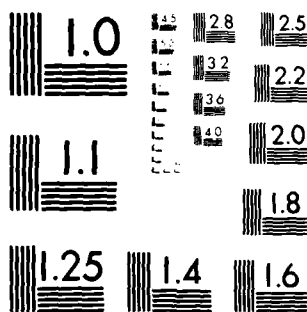
NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
WINNIPAUK DAM (A/K/A F..(U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV MAR 81

1/1

UNCLASSIFIED

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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

WINNIPAUK DAM
(A/K/A/ FLOCK PROCESS DAM)
CT 00531

AD-A144 753

DTIC FILE COPY

NORWALK RIVER BASIN
NORWALK, CONNECTICUT

DTIC
SELECTED
AUG 27 1981

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CONFIDENTIAL

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER CT 00531	2. GOVT ACCESSION NO. A144753	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Winnipauk Dam (A/K/A/ Flock Process Dam) NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE March 1981
		13. NUMBER OF PAGES 25
		15. SECURITY CLASS. (of this report) UNCLASSIFIED
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18. SUPPLEMENTARY NOTES Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) DAMS, INSPECTION, DAM SAFETY, Norwalk River Basin Norwalk, Connecticut		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The dam is too small to qualify under the Federal Dam Inspection Program. Field observations and downstream flood routing computations also indicate that the dam should be classified as "Low" potential hazard.		

ROALD HAESTAD, INC.
CONSULTING ENGINEERS

37 Brookside Road • Waterbury, Conn. 06708 • Tel. 203 753-9800

March 12, 1981

The Department of the Army
Corps of Engineers
New England Division
424 Trapelo Road
Waltham, Massachusetts 02154



Attention: E. P. Gould
Project Management Division

Re: Winnipauk Dam (a/k/a Flock Process Dam)
Norwalk, Connecticut

Gentlemen:

Following field surveys of Winnipauk Dam, we conclude that the dam is too small to qualify under the Federal Dam Inspection Program. Field observations and downstream flood routing computations also indicate that the dam should be classified as "Low" potential hazard.

We are enclosing a brief letter report substantiating our findings.



Very truly yours,
ROALD HAESTAD, INC.

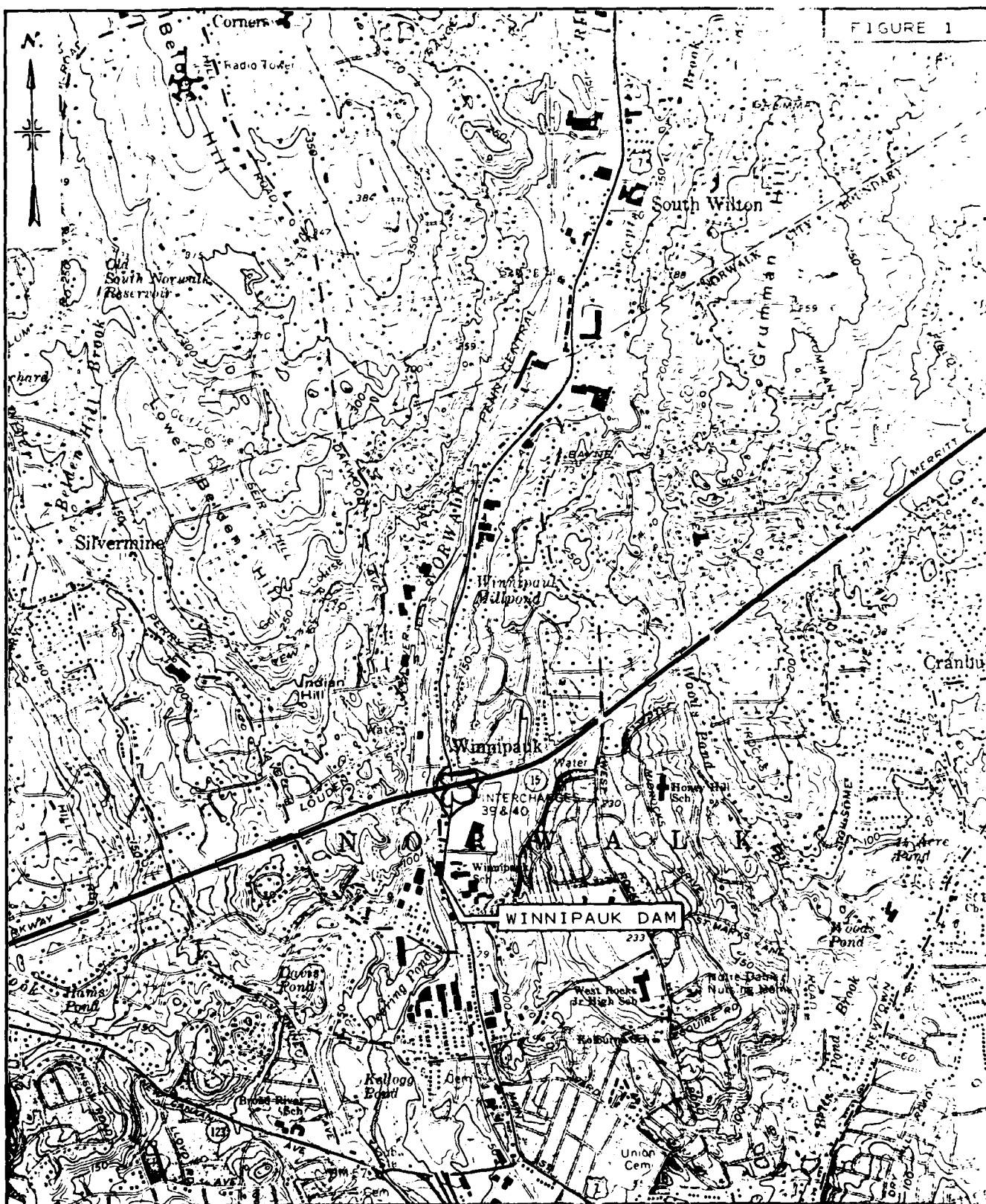
By

Roald Haestad

RH:DLS:cft

TABLE OF CONTENTS

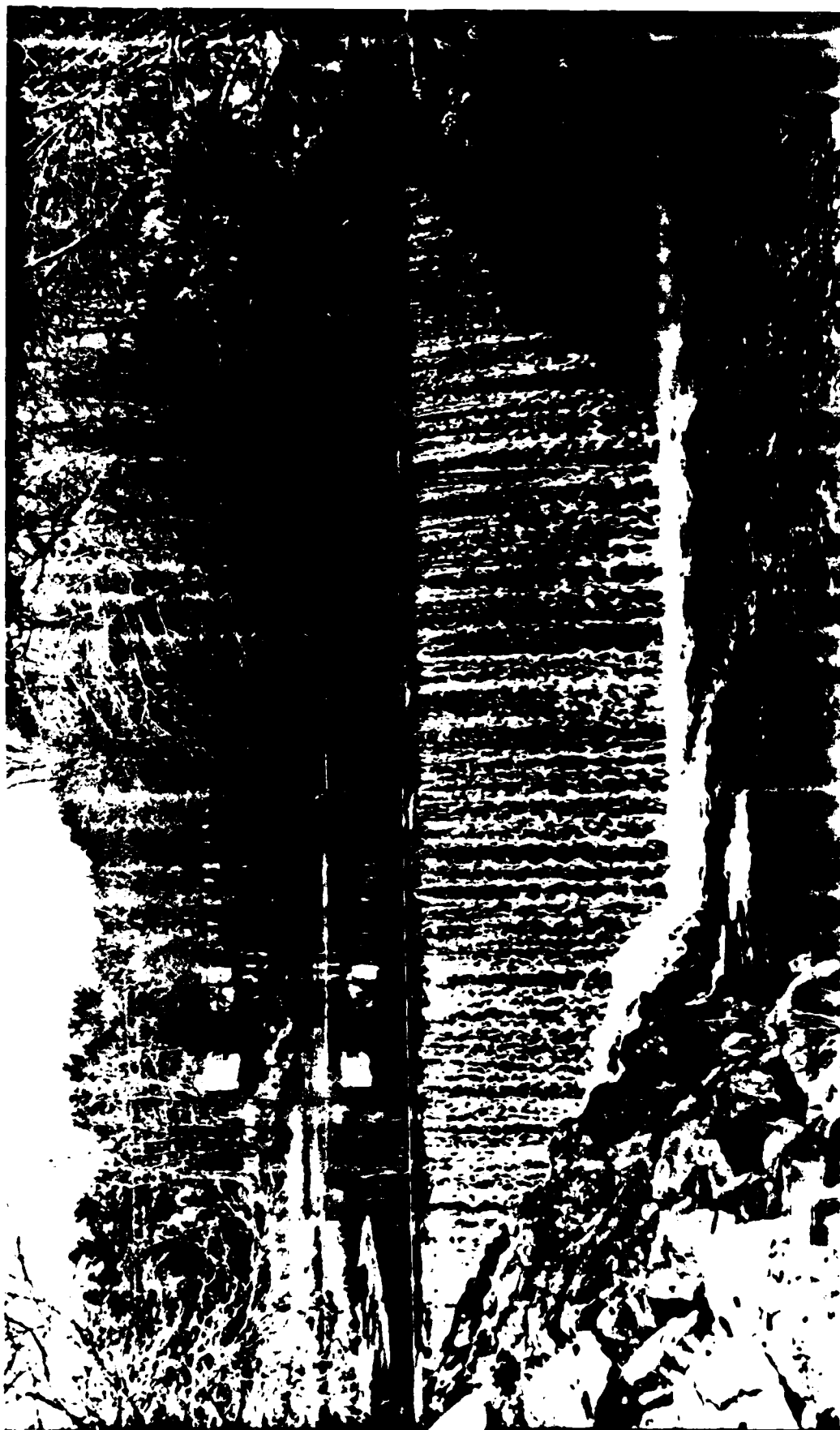
	<u>Page</u>
Location Plan	1
Overview Photo	2
Description	3 - 4
Appendix A Photographs	A-1 - A-4
Appendix B Computations	B-1 - B-5



LOCATION PLAN
WINNIPAUK DAM
NORWALK, CONNECTICUT
SCALE: 1" = 2000'

ROALD HAESTAD, INC.

NORWALK NORTH QUADRANGLE 1971



OVERVIEW PHOTO

U S ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	WINNIPAUK DAM - CT 00531 NORWALK RIVER NORWALK, CONNECTICUT
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

DESCRIPTION

Winnipauk Dam (a/k/a Flock Process Dam)
CT 00531
City of Norwalk, Fairfield County, Connecticut
On the Norwalk River
Owned by Ruth J. Leff et al
c/o Atty. Slavitt Connery
618 West Avenue
Norwalk, Connecticut 06801

The Winnipauk Dam is a run-of-the-river dam consisting of a stone masonry wall with a concrete cap and an upstream earth embankment. The dam has an overflow crest length of 75 feet, a maximum height of 22 feet and outlet works at the left abutment, Overview Photo and Photo 1. The right abutment is a ledge outcrop, Photo 2. A railroad line runs along the right abutment, Photo 1.

There was 0.3 feet of water going over the spillway at the time of inspection, so the condition of the stone masonry wall could not be observed. The concrete weir appeared to be in fair condition. The weir had what looked to be wood planking on both the upstream and downstream edges.

The outlet works at the left abutment, Photo 3, consist of a stone masonry and concrete structure with a 5-1/2' by 5-1/2' sluice gate on the upstream side, Photo 4, which discharges through a partially collapsed 6 foot wide by 4 foot high stone archway at the toe of the left abutment, Photo 3. The sluice gate is obstructed with leaves, sticks and debris and appears to be inoperable. The concrete top of the outlet structure is partially collapsed and the chamber is filled with debris.

The dam has a watershed of 33 square miles and a water surface area of less than two acres. The pond is completely silted in.

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The dam has a watershed of 33 square miles and a water surface area of less than two acres. The pond is completely silted in.

Even assuming an average depth of 20 feet the storage capacity of the impoundment would only be 40 Acre-Feet.

The maximum height of 22 feet and the storage capacity of 40 Acre-Feet are both below the requirements for a "Small" dam. The dam, therefore, does not qualify for inclusion in the Corps of Engineers' Inspection Program.

The downstream channel is the natural river channel, mostly in ledge. A railroad bridge crosses the river approximately 200 feet downstream of the dam, Photo 5. Downstream of the railroad bridge a Corps of Engineers' channel improvement project has provided a channel capacity of about 17,000 cubic feet per second (cfs).

A dam breach analysis was made to determine the hazard classification of the dam. The Corps of Engineers' "Rule of Thumb" Guidance for Estimating Downstream Dam Failure Hydrographs" was used for the dam breach and flood routing. Two failure conditions were analyzed: 1) a failure with the water level at the top of the dam; and 2) failure with the water at spillway level. Under failure condition 1, the remaining spillway flow, after failure, was added to the dam breach flow.

The peak flood flow for a failure with the water level at the top of the dam would be 7,700 cfs, and failure at spillway level would be 3,000 cfs. Neither flow would exceed the capacity of the downstream channel.

The flood routing shows the dam to be "Low" potential hazard.

APPENDIX A

Photographs



PHOTO NO. 1

SPILLWAY



PHOTO NO. 2

EXPOSED LEDGE AT
RIGHT ABUTMENT

U.S. ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS

ROALD HAESTAD, INC.
CONSULTING ENGINEERS
WATERBURY, CONNECTICUT

NATIONAL PROGRAM OF
INSPECTION OF
NON-FED. DAMS

WINNIPAUKE DAM
NORWALK RIVER
NORWALK, CONNECTICUT
CT 00531
17 FEBRUARY 1968



PHOTO NO. 3

LEFT ABUTMENT
AND OUTLET WORKS



PHOTO NO. 4

OUTLET WORKS
FROM UPSTREAM

U.S. ARMY ENGINEER DIV NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS

ROALD HAESTAD, INC.
CONSULTING ENGINEERS
WATERBURY, CONNECTICUT

NATIONAL PROGRAM OF
INSPECTION OF
NON-FED. DAMS

WINNIPAUKE DAM
NORWALK RIVER
NORWALK, CONNECTICUT
CT 0 1
17 FEB 1981



PHOTO NO. 3

LEFT ABUTMENT
AND OUTLET WORKS

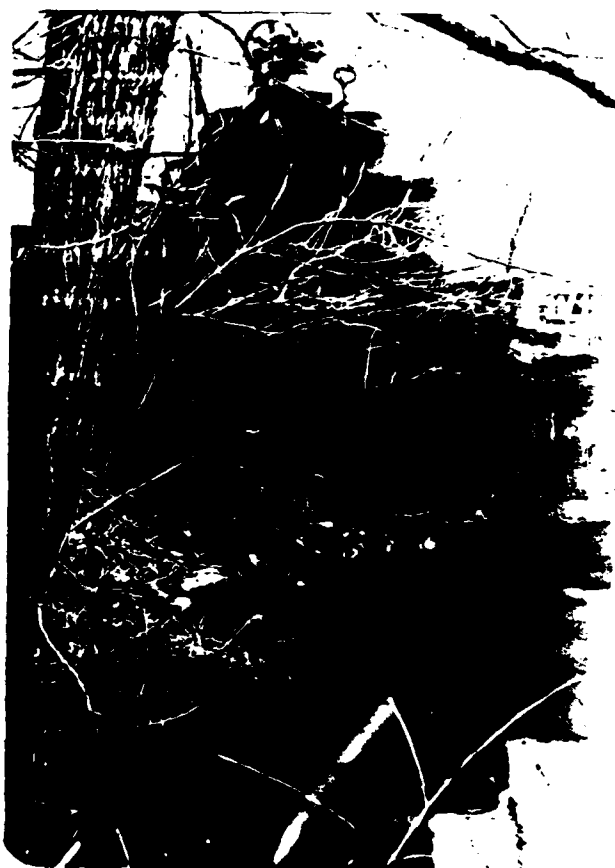


PHOTO NO. 4

OUTLET WORKS
FROM UPSTREAM

US ARMY ENGINEER DIV NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS

ROALD HAESTAD, INC.
CONSULTING ENGINEERS
WATERBURY, CONNECTICUT

NATIONAL PROGRAM OF
INSPECTION OF
NON-FED. DAMS

WINNIPAUKE DAM
NORWALK RIVER
NORWALK, CONNECTICUT
CT 00531

17 FEBRUARY 1981



PHOTO NO. 5

RAILROAD BRIDGE LOOKING DOWNSTREAM FROM DAM.



PHOTO NO. 6

RIVER CHANNEL LOOKING DOWNSTREAM
FROM RAILROAD BRIDGE.

U.S. ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS

ROALD HAESTAD, INC.
CONSULTING ENGINEERS
WATERBURY, CONNECTICUT

NATIONAL PROGRAM OF
INSPECTION OF
NON-FED. DAMS

WINNIPAUKE DAM
NORWALK RIVER

NORWALK, CONNECTICUT

CT 0053

17 FEBRUARY

981

APPENDIX B

Computations

BY SAL DATE 3/4/81 **ROALD HAESTAD, INC.** SHEET NO. 1 OF 4
 CONSULTING ENGINEERS
 CKD BY JLS DATE 3/5/81 37 Brookside Road - Waterbury, Conn. 06708 JOB NO. 49-040
 SUBJECT WINNIPAUKE DAM - Dam breach Calculations

s = Storage at time of failure with water level at top of dam

s = Storage at spillway level + surcharge storage

$$s = (\text{Surface Area} \times \text{Average depth}) + (\text{Surface Area} \times \text{Surcharge Height})$$

$$s = (2 \text{ Acres} \times 13 \text{ feet}) + (2 \text{ Acres} \times 7 \text{ feet})$$

$$s = 26 \text{ Acre-Feet} + 14 \text{ Acre-Feet} = 40 \text{ Acre-Feet}$$

$$Q_{P1} = \frac{8}{27} W_b \sqrt{g} Y_0^{3/2} = \text{Peak Failure Outflow}$$

$$W_b = \text{Breach Width} - 40\% \text{ of dam length across river at mid height} = 0.4(75) = 30 \text{ feet}$$

$$Y_0 = \text{Total height from river bed to pool level at time of failure} = 22 \text{ feet}$$

$$Q_{P1} = \frac{8}{27} (30) \sqrt{32.2} (22)^{3/2} \\ = 5,204 \text{ use } 5,200 \text{ cfs}$$

Dam Breach at spillway level:

$$W_b = 0.4(75) = 30 \text{ feet} \quad Y_0 = 15 \text{ feet}$$

$$Q_{P1} = \frac{8}{27} (30) \sqrt{32.2} (15)^{3/2} \\ = 2,930 \text{ use } 3,000 \text{ cfs}$$

Spillway discharge capacity over a 45 foot length.

$$L = 45 \text{ feet (the remainder of the length is assumed to fail with the dam)}$$

$$C = 3.0$$

$$Q = CLH^{3/2} \\ = 3(45)(7)^{3/2} \\ = 2,500 \text{ cfs}$$

$$\text{Failure at top of dam} = 57 + 2,500 = 7,700 \text{ cfs}$$

BY SAL DATE 3/4/81

ROALD HAESTAD, INC.

SHEET NO 2 OF 4

CKD BY DLS DATE 3/5/81

CONSULTING ENGINEERS

JOB NO. 049 040

SUBJECT WINNIPAUK DAM-DEPTH OF FLOW

SECTION NUMBER 2

TYPICAL SECTION

H (FT)	W (FT)	A (SQ-FT)	R (FT)	S (FT/FT)	V (FT/SEC)	Q (CFS)
1.0	50	44	0.87	0.0046	2.78	121
2.0	54	95	1.76	0.0046	4.45	422
3.0	57	149	2.59	0.0046	5.76	859
4.0	61	206	3.38	0.0046	6.87	1417
5.0	65	266	4.12	0.0046	7.85	2090
6.0	68	329	4.83	0.0046	8.72	2874
7.0	72	396	5.51	0.0046	9.52	3768
8.0	76	465	6.15	0.0046	10.25	4763
9.0	82	538	6.60	0.0046	10.75	5785
10.0	88	617	7.03	0.0046	11.21	6921
11.0	94	703	7.47	0.0046	11.67	8198
12.0	100	794	7.90	0.0046	12.12	9623
13.0	107	891	8.35	0.0046	12.57	11201
14.0	113	994	8.79	0.0046	13.01	12941
15.0	119	1104	9.24	0.0046	13.45	14847
16.0	126	1219	9.70	0.0046	13.89	16927

MANNING COEFFICIENT=N=0.0330

REACH OUTFLOW=QP2= 7700 CFS
DEPTH OF FLOW=H2= 10.6 FT.

BY W.S. DATE 3-5-81

ROALD HAESTAD, INC.
CONSULTING ENGINEERS

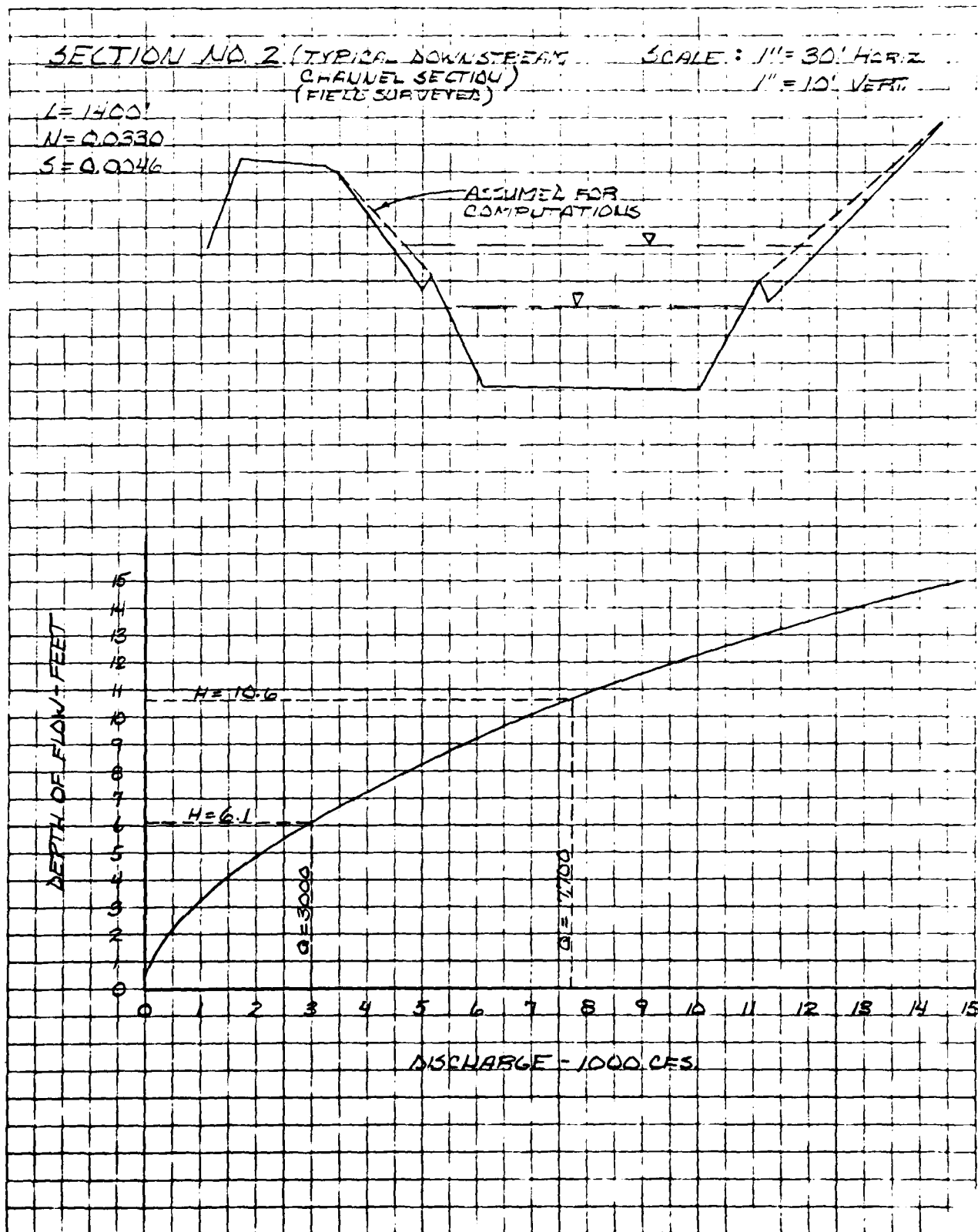
SHEET NO. 3 OF 4

CKD BY SAL DATE 3-5-81

37 Brookside Road - Waterbury, Conn. 06708

JOB NO. 59-271

SUBJECT WINNIPIAN DAM - DEPTH OF FLOW



BY SAL DATE 3/4/81 **ROALD HAESTAD, INC.** SHEET NO. 4 OF 4
CONSULTING ENGINEERS
CKD BY DLS DATE 3/5/81 37 Brookside Road - Waterbury, Conn. 06708 JOB NO. 49-040
SUBJECT WINNIPIPIK DAM - Bridges Discharge Capacity

SECTION NO. 1: (Railroad Bridge)

Height = 11 feet (Average) Width = 144 feet

$H_w/D = 11/11 = 1$ Entrance Cond: 90° and 15°

$$Q = 95 \text{ cfs/ft} \times 144 \text{ ft} = 13,680 \text{ cfs}$$

SECTION NO. 3: (Perry Avenue)

Height = 15 feet (Average) Width = 78 feet

$H_w/D = 15/15 = 1$ Entrance Cond.: 45°

$$Q = 160 \text{ cfs/ft} \times 78 \text{ ft} = 12,480 \text{ cfs}$$

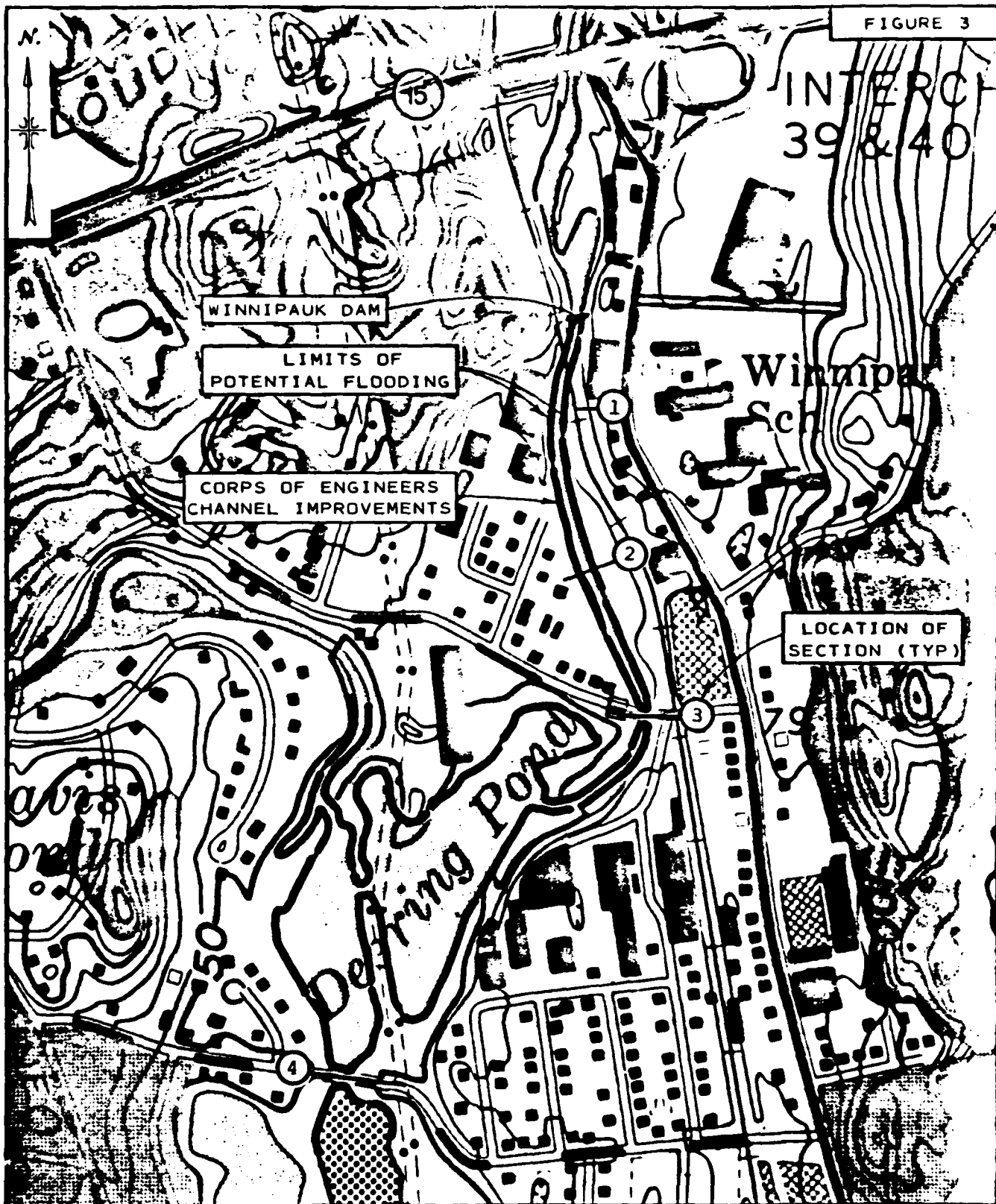
SECTION NO. 4: (Deering Pond and Kellogg Pond Bridge - Broad Street)

Height = 11 feet (Average) Width = 157 feet

$H_{wmax} = 6.5 \text{ ft}$ to approximate sill level of nearby homes

$H_{wmax}/D = 6.5/11 = 0.59$ Entrance Cond. = 45°

$$Q = 50 \text{ cfs/ft} \times 157 \text{ ft} = 7,850 \text{ cfs}$$



LIMITS OF POTENTIAL FLOODING
WINNIPAUK DAM

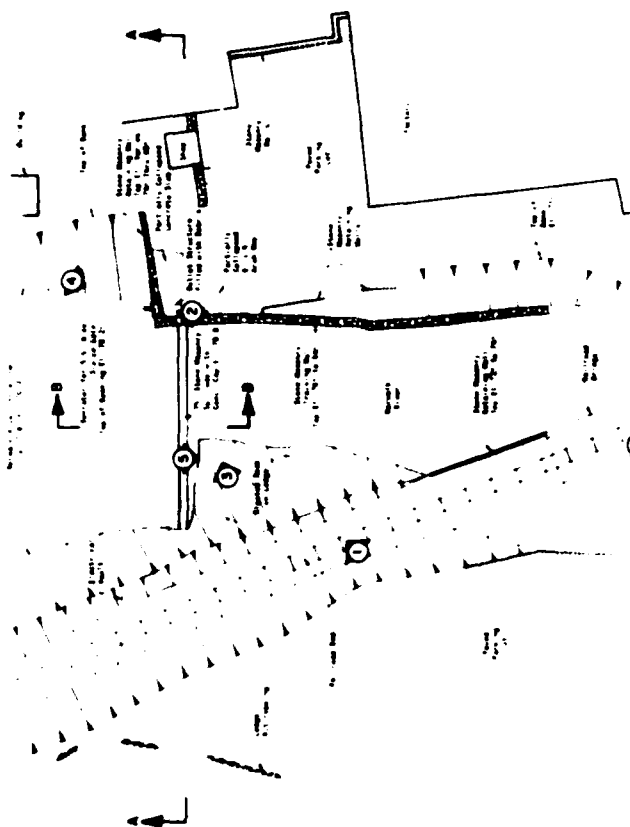
FAILURE WITH WATER LEVEL AT TOP OF DAM

SCALE: 1" = 500'

ROALD HAESTAD, INC.

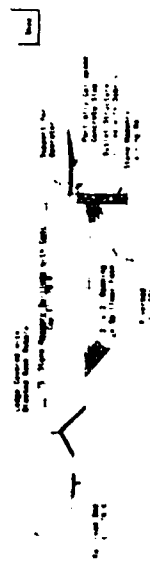
MARCH 1981

Figure 2



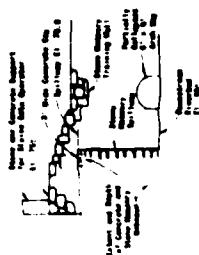
PLAN

40



SECTION A-A

...



SECTION 0-0

11-11-11

1. NAME OF THE PERSON OR ORGANIZATION:	U.S. JURY BETWEEN THE NEW YORK CITY OF NEW YORK NEW YORK, NEW YORK
2. ADDRESS:	NATIONAL PROGRAM OF INSPECTION OF HIGH-POSSIBLE

WINNIPAX DAM

1	2	3	4	5
DATE	TIME	LOCATION	DATE	TIME
10/10/78	10:00	10000	10/10/78	10:00